ISSN: 0975-3583,0976-2833 VOL15, ISSUE 08, 2024

Type of Article: Case Series

A Comprehensive Evaluation and Management of Orbital mass lesions in patients attending a tertiary hospital

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Introduction

Orbital mass lesions encompass a wide range of pathologies that can significantly impact vision, ocular function, and overall quality of life. These lesions can be benign or malignant, congenital or acquired, and may arise from any of the numerous tissues that constitute the orbit, including bone, muscle, nerve, and vascular structures.[1] The clinical presentation of orbital mass lesions is highly variable, depending on the size, location, and nature of the lesion, ranging from asymptomatic masses to those causing proptosis, diplopia, pain, or vision loss.[2]

The evaluation and management of orbital mass lesions present a unique challenge due to the intricate anatomy of the orbit and the potential for significant morbidity. A comprehensive approach, integrating detailed clinical assessment, advanced imaging modalities, and, when necessary, histopathological examination, is essential for accurate diagnosis and optimal management.[3]

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Orbital masses can be classified based on their origin—primary, secondary, or metastatic—and their nature—benign or malignant. In adults, the most common benign orbital tumors include cavernous hemangiomas, while lymphomas are the most frequent malignant orbital masses. In contrast, in pediatric populations, dermoid cysts and rhabdomyosarcomas are more prevalent.[4] The incidence and prevalence of these lesions can vary significantly based on geographic, demographic, and genetic factors, underscoring the need for region-specific data to guide clinical practice.

A thorough clinical evaluation is the cornerstone of managing orbital mass lesions. The assessment begins with a detailed history, focusing on the onset, duration, and progression of symptoms, as well as any associated systemic signs. A comprehensive ocular examination, including visual acuity, pupillary reactions, ocular motility, and fundus examination, is crucial. Signs such as proptosis, restricted eye movements, or optic disc changes may provide clues to the underlying pathology.[5]

Radiological imaging is pivotal in the evaluation of orbital mass lesions. Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) are the primary imaging modalities used, each offering distinct advantages. CT imaging is excellent for assessing bony involvement and calcifications, making it particularly useful in evaluating masses such as osteomas and ossifying fibromas. MRI, on the other hand, provides superior soft-tissue contrast and is invaluable in characterizing the lesion's extent, composition, and relationship with adjacent structures, especially for masses like cavernous hemangiomas and optic nerve gliomas.[6]

The management of orbital mass lesions is dictated by the type, location, and behavior of the lesion. Benign, asymptomatic masses may be managed conservatively with regular monitoring, while symptomatic or malignant lesions often require surgical intervention. Advances in orbital surgery, including minimally invasive techniques, have improved the safety and efficacy of tumor removal. In cases of malignancy, multimodal treatment approaches, including surgery, radiotherapy, and chemotherapy, may be necessary to achieve optimal outcomes.[7]

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The comprehensive evaluation and management of orbital mass lesions require a multidisciplinary approach, involving ophthalmologists, radiologists, pathologists, and oncologists. Early and accurate diagnosis, guided by clinical assessment and imaging, is crucial in preventing morbidity and preserving vision. This article aims to provide a detailed overview of the current strategies in the diagnosis and management of orbital mass lesions, highlighting recent advances and ongoing challenges in this complex field.

Case Series: Orbital Mass Lesions

Case 1: Dermoid Cyst

Clinical Presentation:
A 7-year-old female presented with a painless, slowly enlarging mass at the superolateral aspect of her left orbit. The mass had been present since birth but had recently begun to increase in size. There was no history of trauma or visual disturbances.

Imaging Findings:
CT imaging revealed a well-circumscribed, low-density lesion at the superolateral orbital rim, with no evidence of bone involvement or surrounding tissue reaction. The lesion was consistent with a dermoid cyst, characterized by its typical location and appearance.

Management and Outcome:
The patient underwent surgical excision of the cyst through a small incision at the eyebrow, which allowed for complete removal without damage to surrounding structures. Histopathological examination confirmed the diagnosis of a dermoid cyst. The patient had an uneventful recovery, with no recurrence at follow-up one year later.

Case 2: Epidermal Inclusion Cyst

Clinical Presentation:
A 5-year-old male presented with a painless swelling in the upper eyelid of the left eye. The mass had been slowly increasing in size over the past year. There was no history of trauma, infection, or previous surgeries.

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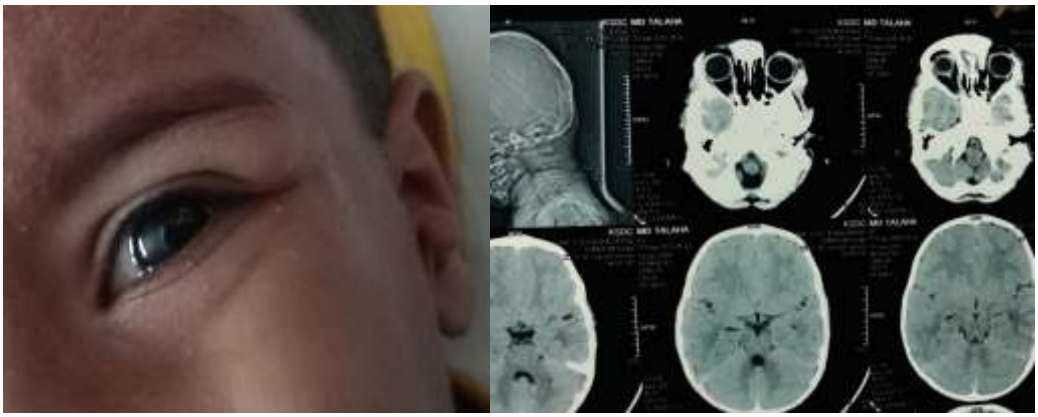
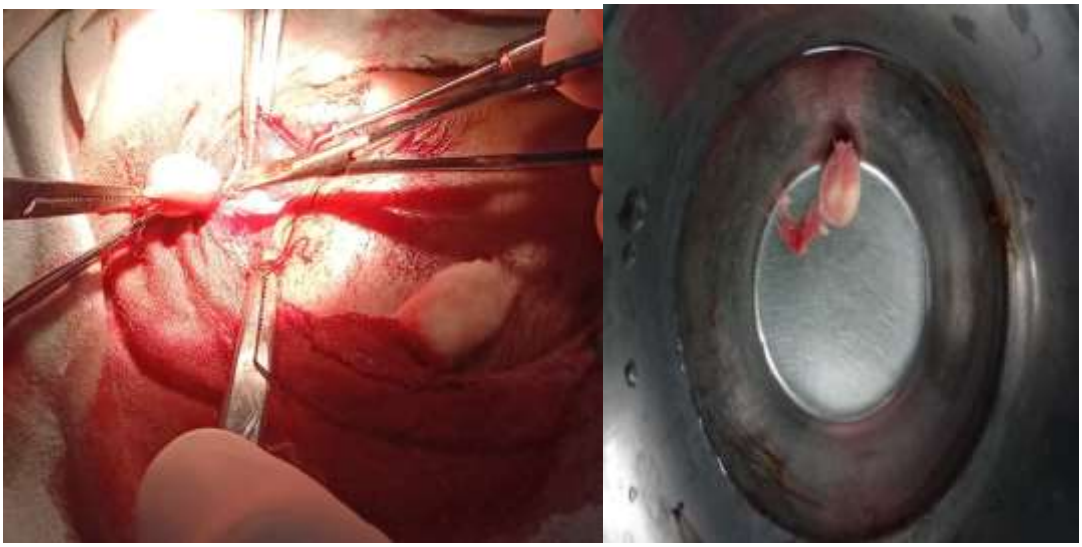


Imaging Findings:
CT of the orbit showed a well-defined, homogenous, hypodense mass located within the subcutaneous tissue of the upper eyelid, with no signs of extension into the orbit or bone involvement. The imaging findings were consistent with an epidermal inclusion cyst.

Management and Outcome:
The cyst was excised under local anesthesia, with care taken to avoid damage to the levator palpebrae superioris muscle. The histopathological analysis confirmed the diagnosis of an epidermal inclusion cyst. The patient's recovery was uneventful, and no recurrence was observed during the six-month follow-up period.



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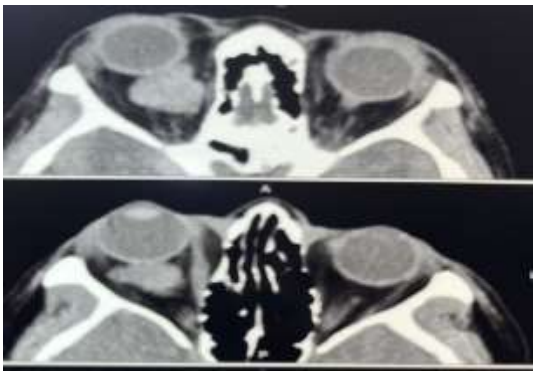
Case 3: Orbital Schwannoma

Clinical Presentation:
A 40-year-old female presented with gradually progressive proptosis of the right eye over a period of six months. She reported mild discomfort but no significant pain or vision changes.

Examination revealed mild limitation in upward gaze.

Imaging Findings:
CT revealed a well-circumscribed, ovoid mass in the intraconal space, causing displacement of the optic nerve. The lesion was heterogeneously hyperdensewith intense enhancement following contrast administration. Thesefindings were confirmed by MRI which was suggestive of an orbital schwannoma



Management and Outcome:
The patient underwent a lateral orbitotomy for the removal of the tumor. Complete excision was achieved without compromising the optic nerve. Histopathological examination confirmed the diagnosis of a benign schwannoma. The patient experienced full recovery of eye movements postoperatively, with no signs of recurrence after one year.

Case 4: Cavernous Hemangioma

Clinical Presentation:
A 55-year-old male presented with a painless, slowly progressive proptosis of the right eye over two years. He did not report any pain or visual disturbances. The examination revealed axial proptosis with no restriction of eye movements.

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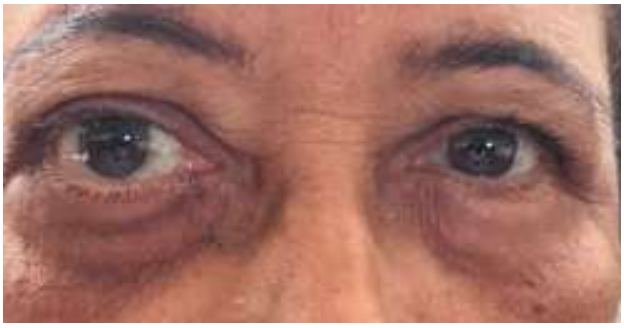

Imaging Findings:
CT scan demonstrated a well-defined, round, hyperdense mass in the intraconal space, displacing the optic nerve but not involving the bony orbit. MRI confirmed the presence of a homogenous, enhancing lesion, characteristic of a cavernous hemangioma.

Management and Outcome:
The patient underwent a transconjunctival orbitotomy for the complete removal of the hemangioma. The mass was removed intact without any complications, and histopathology confirmed the diagnosis of cavernous hemangioma. The patient's postoperative course was uneventful, with complete resolution of proptosis and no recurrence at six months follow-up.

Case 5: Neurofibroma

Clinical Presentation:
A 30-year-old male with a known history of neurofibromatosis type 1 presented with a slowly enlarging mass in the left orbit, associated with mild proptosis and decreased visual acuity over the past year. The patient had multiple cutaneous neurofibromas and café-au-lait spots.

Imaging Findings:
MRI showed a diffuse, irregularly shaped mass involving the orbital soft tissues, extending into the eyelid and adjacent facial structures. The mass was isointense on T1 and T2-weighted images, with heterogenous enhancement post-contrast. The findings were consistent with a plexiform neurofibroma.

Management and Outcome:
Given the extensive involvement and risk of significant morbidity, a conservative approach was initially adopted, with regular monitoring. However, due to progressive visual impairment, the

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 08, 2024

patient underwent debulking surgery. Histopathological analysis confirmed the diagnosis of neurofibroma. The patient showed partial improvement in symptoms, but long-term monitoring was planned due to the potential for recurrence and the complex nature of neurofibromatosis.

Discussion

Orbital mass lesions encompass a wide spectrum of pathologies, ranging from benign congenital cysts to malignant tumors. The cases presented in this series highlight the diversity of orbital mass lesions and underscore the importance of accurate diagnosis and individualized management strategies.

Clinical Presentation and Diagnosis

The clinical presentations of the orbital mass lesions in this series varied significantly, with symptoms ranging from painless swelling to proptosis and vision impairment. This variability is consistent with findings from other studies, which indicate that the clinical manifestation of orbital masses is highly dependent on the size, location, and nature of the lesion.[8] For instance, dermoid cysts and epidermal inclusion cysts, which are typically benign and slow-growing, presented primarily as painless masses, reflecting their indolent nature.[9] In contrast, more complex lesions such as schwannomas and neurofibromas often presented with proptosis and, in some cases, visual disturbances, indicative of their potential to affect surrounding structures, including the optic nerve.[10]

Imaging Techniques

Radiological imaging played a pivotal role in the diagnosis and management of the orbital mass lesions in this series. CT and MRI were the primary imaging modalities used, each offering unique advantages. CT imaging was particularly valuable in assessing bony involvement and detecting calcifications, as seen in the case of the dermoid cyst, where the typical location and appearance on CT were diagnostic.[10] MRI, with its superior soft-tissue contrast, was essential in characterizing the extent of lesions such as orbital schwannomas and cavernous hemangiomas. The ability of MRI to differentiate between benign and malignant features based on signal

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 08, 2024

intensity and enhancement patterns was critical in guiding management decisions, as noted in previous studies.[11]

Management Strategies

The management of orbital mass lesions must be tailored to the specific type and behavior of the lesion. In this series, surgical excision was the primary treatment modality for most cases, particularly when the lesion was causing significant symptoms or had the potential to affect vision. The approach to surgery varied depending on the location and extent of the lesion. For example, dermoid cysts and epidermal inclusion cysts, being well-circumscribed and superficial, were amenable to complete excision with minimal morbidity.[12] Conversely, the management of neurofibromas, particularly those associated with neurofibromatosis type 1, was more complex due to their diffuse nature and potential for recurrence. This aligns with findings from studies that suggest a conservative approach with careful monitoring is often appropriate for neurofibromas, with surgical intervention reserved for cases with progressive symptoms.[13]

Cavernous hemangiomas, being the most common benign orbital tumors in adults, are typically well-encapsulated and can be excised completely, as was the case in this series. The excellent prognosis following complete resection of cavernous hemangiomas has been well documented in the literature, with most patients experiencing full recovery of ocular function postoperatively.[14]

Complications and Outcomes

The outcomes in this case series were generally favorable, with complete resolution of symptoms and no significant complications in most cases. However, the case of neurofibroma highlights the challenges associated with managing more aggressive or complex lesions, particularly those that are part of a systemic condition like neurofibromatosis. These cases often require ongoing surveillance due to the potential for recurrence or progression, a finding that is consistent with other studies emphasizing the importance of long-term follow-up in patients with neurofibromatosis.[15]

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Conclusion

The management of orbital mass lesions requires a comprehensive, multidisciplinary approach that incorporates detailed clinical assessment, advanced imaging, and individualized treatment strategies. The cases presented in this series demonstrate the diverse presentations and outcomes associated with these lesions, emphasizing the need for tailored management plans that consider the specific characteristics of each lesion.

The role of imaging, particularly MRI, cannot be overstated in the evaluation of these masses, as it provides crucial information that guides both diagnosis and management. Furthermore, the importance of surgical expertise in achieving optimal outcomes, particularly in the complete excision of benign lesions, is evident from the successful treatment of cases in this series. Future studies should continue to explore the long-term outcomes of various treatment approaches, particularly in complex cases involving systemic conditions like neurofibromatosis.

References

1. Benign Orbital Tumors - StatPearls - NCBI Bookshelf [Internet]. [cited 2024 Aug 13]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK585125/

2. Orbital tumours and tumour-like lesions: exploring the armamentarium of multiparametric imaging - PMC [Internet]. [cited 2024 Aug 13]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4729705/

3. Clinical Assessment and Lesion-Specific Management of Orbital Vascular Malformations - PMC [Internet]. [cited 2024 Aug 13]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7987384/

4. Primary Malignant Orbital Tumors - PMC [Internet]. [cited 2024 Aug 13]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7987380/

5. Orbital masses: CT and MRI of common vascular lesions, benign tumors, and malignancies - PMC [Internet]. [cited 2024 Aug 13]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3729513/

6. The role of multidetector computed tomography and magnetic resonance recent imaging techniques in the evaluation of intra-conal orbital lesions - ScienceDirect [Internet]. [cited 2024 Aug 13]. Available from: https://www.sciencedirect.com/science/article/pii/S0378603X1400165X

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 08, 2024

7. Management of Orbital Masses: Outcomes of Endoscopic and Combined Approaches With No Orbital Reconstruction - PMC [Internet]. [cited 2024 Aug 13]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6961138/

8. Imaging Findings of Pediatric Orbital Masses and Tumor Mimics | RadioGraphics [Internet]. [cited 2024 Aug 13]. Available from: https://pubs.rsna.org/doi/10.1148/rg.210116

9. Epidermal Inclusion Cyst - StatPearls - NCBI Bookshelf [Internet]. [cited 2024 Aug 13]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK532310/

10. NEUROFIBROMATOSIS-RELATED TUMORS: EMERGING BIOLOGY AND THERAPIES - PMC [Internet]. [cited 2024 Aug 13]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4374132/

11. MRI to differentiate benign from malignant soft-tissue tumours of the extremities: a simplified systematic imaging approach using depth, size and heterogeneity of signal intensity - PMC [Internet]. [cited 2024 Aug 13]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3474004/

12. A Clinical Update and Radiologic Review of Pediatric Orbital and Ocular Tumors - Rao - 2013 - Journal of Oncology - Wiley Online Library [Internet]. [cited 2024 Aug 13]. Available from: https://onlinelibrary.wiley.com/doi/10.1155/2013/975908

13. Management of cutaneous neurofibroma: current therapy and future directions - PMC [Internet]. [cited 2024 Aug 13]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7317049/

14. Typical Orbital Pathologies: Hemangioma - PMC [Internet]. [cited 2024 Aug 13]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7987401/

15. JCM | Free Full-Text | Surgical Treatment and Complications of Deep-Seated Nodular Plexiform Neurofibromas Associated with Neurofibromatosis Type 1 [Internet]. [cited 2024 Aug 13]. Available from: https://www.mdpi.com/2077-0383/11/19/5695